



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/600,601	06/20/2003	Eric Anderson	100202201-1	5490
22879	7590	01/03/2006	EXAMINER SAEED, USMAAN	
HEWLETT PACKARD COMPANY P O BOX 272400, 3404 E. HARMONY ROAD INTELLECTUAL PROPERTY ADMINISTRATION FORT COLLINS, CO 80527-2400			ART UNIT 2166	PAPER NUMBER

DATE MAILED: 01/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>
	10/600,601 Examiner Usmaan Saeed	ANDERSON, ERIC Art Unit 2166

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 20 June 2003.
- 2a) This action is FINAL.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-28 is/are pending in the application.
  - 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-28 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 22 March 2004 is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) All    b) Some \* c) None of:
    1. Certified copies of the priority documents have been received.
    2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. _____ .
3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>06/20/2003</u> .	5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)
	6) <input type="checkbox"/> Other: _____ .

**DETAILED ACTION**

1. Claims 1-28 are pending in this office action.

***Information Disclosure Statement***

2. Applicants Information Disclosure Statement, filed 20 June 2003, has been received, entered into record and considered. See attached form PTO-1449.

***Drawings***

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: Apparatus 500. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: 700. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 101***

4. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-13 are rejected under 35 U.S.C. 101 as being directed to non-statutory subject matter. The language of these claims raises a question as to whether the claims are directed merely to an abstract idea, which would result in a practical application

producing a concrete useful, and tangible result to form the basis of statutory subject matter under 35 U.S.C. 101.

To expedite a complete examination of the instant application the claims rejected under U.S.C. 101 (nonstatutory) above are further rejected as set forth below in anticipation of application amending these claims to place them within the four categories of invention.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-28 are rejected under 35 U.S.C. 102(b) as being anticipated by **Borowsky et al (Borowsky hereinafter)** (U.S. Patent 6,381,619).

With respect to claim 1, **Borowsky teaches a method for performing adaptive migration and execution, the method comprising:**

**"obtaining a plan"** as the migration plan generator develops a plan that leads to the lowest contention for the system (**Borowsky** Col 2, Lines 35-36). The reference teaches that the plan is being developed for migration.

**"adapting the plan to satisfy migration constraints"** as the migration plan generator 100, the initial configuration data 110, the goal configuration data 112, and the set of constraints 114 are provided to a migration planner 116. The migration planner 116 either fails to develop a migration plan and exits to "fail" block 118 or produces a viable migration plan 120 (**Borowsky** Col 5, Lines 6-11). The plan being produced by the migration plan generator is only developed/adopted when the set of constraints provided to the planner are satisfied.

**"starting at least one move of a data chunk in the plan"** as the data stores are moved, or migrated, among the storage devices under the direction of a control 28 (**Borowsky** Col 4, Lines 49-51).

With respect to claim 2, **Borowsky** further teaches "**the method of claim 1, wherein the steps in the method are repeated until no moves are pending**" as the present invention provides a computer data storage system with a migration plan generator which includes a "Simple" migration planner which provides for making terminal moves until no further terminal moves are possible based on random, preset, or functional ordering (**Borowsky** Col 2, Lines 15-20).

With respect to claim 3, **Borowsky** further teaches “**the method of claim 2, further comprising: waiting for all in-progress executions of moves to complete after no moves are pending**” as after a program has processed the possible moves, the then current configuration is compared with the goal configuration in the “goal configuration met?” decision block 172. If the goal configuration has not been met, the program proceeds back to the “select plan” block 152 and, if it has it, exits as the migration plan 120 (**Borowsky** Col 5, Lines 59-64). The reference teaches that the program processes/executes all the possible moves and it has to wait for all the executions in order to check if the configurations have been met.

With respect to claim 4, **Borowsky** further teaches “**the method of claim 1, further comprising: waiting for a move to complete if the adaptation of the plan indicates no moves meet the migration constraints**” as establishing that no other moves are possible after the store E move (**Borowsky** Col 6, Lines 47-48). The set of constraints 114 prevents certain moves (**Borowsky** Col 4, Line 54). This means that after the completion of the store E move, no other moves are possible and constraints play a part in preventing certain moves.

With respect to claim 5, **Borowsky** further teaches “**the method of claim 1, further comprising:**

**“estimating load value information”** as the load placed by the move on the system should be minimized (in terms of data stores moved, time taken (parallel or sequential), bandwidth used, or similar metric) (**Borowsky** Col 6, Lines 24-27). **“using the load value information”** as the load placed by the move on the system should be minimized (in terms of data stores moved, time taken (parallel or sequential), bandwidth used, or similar metric) (**Borowsky** Col 6, Lines 24-27). **“assist in determining a modified plan”** as an alternative migration plan would have been to move the store B from device 1 to the device 3 and move the store D from the device 2 to the device 1 (**Borowsky** Col 6, Lines 58-61). Figure 6 also have all the other different/modified/new plans that can be selected for use of migration. It is using the load value to find a modified/different/new plan since the constraints to select a plan contain a capacity constraint which examiner interprets as a load constraint.

With respect to claim 6, **Borowsky** further teaches **the method of claim 1, wherein adapting the plan comprises:**

**selecting at least one step from the following**

“**pruning at least one move that violate a migration constraint**” as the set of constraints 114 contains the capacities of the data storage devices, the capacities of the data stores, the bandwidth, movement rate, and other limitations on the moves (**Borowsky** Col 4, Lines 51-53). Therefore these set of constraints are being used in the pruning of the moves.

**"selecting a largest set of moves that do not violate a migration constraint; and skipping a move that violates a migration constraint"** as if a terminal move is possible, the program proceeds to the "constraints met?" decision block 138. The "constraints met?" decision block 138 receives the set of constraints 114 to determine whether or not the constraints have been met. If they have not been met, the program returns to the "build plan" block 132. If the constraints have been met, the program proceeds to the "select terminal move" block 140 (**Borowsky** Col 5, Lines 22-29). If the moves do not violate the migration constraints they are added to the plan and if they violate the constraints they are not added to that plan.

With respect to claim 7, **Borowsky** further teaches "**the method of claim 1, further comprising: treating a data chunk as existing in an old location and new location while a move is in progress**" as the initial configuration system 22, the initial configuration has device 1 with store A and store B assigned to it, device 2 with store C and store D assigned to it, and device 3 with store E assigned to it. In the goal configuration system 26, the goal configuration has device 1 with store A, store D, and store E assigned to it, device 2 with store C and store B assigned to it, and device 3 with no data block assigned to it (**Borowsky** Col 3, Lines 40-48). Therefore when a move is in progress it treats the initial and goal configuration, both having the data chunk E since they use memory in old and new locations.

With respect to claim 8, **Borowsky** further teaches “**the method of claim 7, wherein the step of treating the data chunk comprises: pruning moves that violate an access rule when a move is in progress**” as there are different blocks of data in the storage system. The access patterns to these blocks of data changes over time. Further, devices may fail or be added or subtracted. Thus, the ultimate goal is a data storage system which is not only able to automatically configure itself, but to reconfigure itself ‘on-the-fly’; i.e. move stored data around based on changing access patterns (**Borowsky** Col 1 Lines 65-67, Col 2 Lines 1-4). The reference is pruning the moves that are violating the access rules since they are changed and then the reference is reconfiguring these moves based on the changed access patterns/rules.

With respect to claim 9, **Borowsky** further teaches “**the method of claim 7, wherein the step of treating the data chunk comprises: considering the data chunk as decreasing a per-node free space information at both the old location and the new location when a move is in progress**” as the present invention further provides a computer data storage system with a migration plan generator which includes a "Greedy" migration planner which uses a "contention" metric. The "contention" of a data storage device is defined as the total size of the data stores that need to move onto such data storage device, divided by the amount of free space on such data storage device. The contention of the entire system is the sum of the contention over all the data storage devices. The migration plan generator develops a plan that leads to the lowest contention for the system (**Borowsky** Col 2, Lines 27-36).

The free space is decreasing since plan generator s trying for develop a plan, which leads to lowest contention in order to use the least space required.

With respect to claim 10, **Borowsky** further teaches **a method for performing adaptive migration and execution, the method comprising:**

**“obtaining a plan”** as the migration plan generator develops a plan that leads to the lowest contention for the system (**Borowsky** Col 2, Lines 35-36). The reference teaches that the plan is being developed for migration.

**“determining all valid moves in the plan”** as if there is a data storage device that has terminal moves going into it but none going out, then all these terminal moves will be valid, since the data storage device can clearly accommodate all the data stores in the goal configuration (**Borowsky** Col 8, Lines 17-21). The reference is determining the valid moves that the data storage device can handle.

**“starting a valid move”** as the data stores are moved, or migrated, among the storage devices under the direction of a control 28 (**Borowsky** Col 4, Lines 49-51). **“if additional moves are required”** as if there is a data storage device that has terminal moves going into it but none going out, then all these terminal moves will be valid, since the data storage device can clearly accommodate all the data stores in the goal configuration (**Borowsky** Col 8, Lines 17-21). The reference is determining the valid moves that the data storage device can handle and it would have additional moves after starting the first move. **“obtaining a modified plan after starting the valid move”** as after a program has processed the possible moves, the then current

configuration is compared with the goal configuration in the "goal configuration met?" decision block 172. If the goal configuration has not been met, the program proceeds back to the "select plan" block 152 and, if it has it, exits as the migration plan 120 (**Borowsky** Col 5, Lines 59-64). Therefore it proceeds to get another/modified plan with more valid moves if the configurations are not met with the first set of moves.

With respect to claim 11, **Borowsky** further teaches "**the method of claim 10, further comprising: determining if an executor is available**" as after a program has processed the possible moves, the then current configuration is compared with the goal configuration in the "goal configuration met?" decision block 172. If the goal configuration has not been met, the program proceeds back to the "select plan" block 152 and, if it has it, exits as the migration plan 120 (**Borowsky** Col 5, Lines 59-64). The reference teaches that the program processes/executes all the possible moves and the executor has to be available to execute the moves.

Claim 12 is same as claim 2 and is rejected for the same reasons as applied hereinabove.

Claim 13 is same as claim 3 and is rejected for the same reasons as applied hereinabove.

With respect to claim 14, **Borowsky further teaches an article of manufacture, comprising: a machine-readable medium having stored thereon instructions to:**

“**obtain a plan**” as the migration plan generator develops a plan that leads to the lowest contention for the system (**Borowsky Col 2, Lines 35-36**). The reference teaches that the plan is being developed for migration.

“**adapt the plan to satisfy migration constraints**” as the migration plan generator 100, the initial configuration data 110, the goal configuration data 112, and the set of constraints 114 are provided to a migration planner 116. The migration planner 116 either fails to develop a migration plan and exits to “fail” block 118 or produces a viable migration plan 120 (**Borowsky Col 5, Lines 6-11**). The plan being produced by the migration plan generator is only developed/adopted when the set of constraints provided to the planner are satisfied.

“**start at least one move of a data chunk in the plan**” as the data stores are moved, or migrated, among the storage devices under the direction of a control 28 (**Borowsky Col 4, Lines 49-51**).

With respect to claim 15, **Borowsky further teaches an apparatus for adaptive migration, the apparatus comprising:**

“**a planner configured to generate a migration plan based upon configuration information**” as the present invention provides a computer data storage system with a migration plan generator which includes a “Simple” migration planner which provides for making terminal moves until no further terminal moves are possible

based on random, preset, or functional ordering (**Borowsky** Col 2, Lines 15-20). Fig 1 provides an overview of the invention and its migration from an initial configuration to a goal configuration (**Borowsky** Col 2, Lines 65-67). There is migration planner, which provides migration plan for making the moves. These moves are based on configuration information since initial configuration is being changed to final configuration.

**"an adapter configured to receive the plan from the planner, to receive migration constraints information, target configuration information and current configuration information, and to transmit configuration information to the planner"** as in the migration planner 116B of FIG. 6, the program begins at "start" block 150 and moves to select a plan in "select plan" block 152. The "select plan" block receives the initial configuration data 110, the goal configuration data 112, and the set of constraints 114 (**Borowsky** Col 8, Lines 36-40). The planner is receiving all the information about the initial/current configuration, goal/target configurations and the set of constraints.

**"at least one executor configured to execute a move in the plan"** as the plan might have to be executed in one hour. With a very slow data storage device, like a tape drive, and a large data store that needs to be moved, it might not be feasible to move the data store onto and off the tape drive because that may take more time than the hour set for completing the plan (**Borowsky** Col 5 Lines 1-5). Therefore the reference includes an executor, which executes a plan for moving data.

With respect to claim 16, **Borowsky** further teaches “**the apparatus of 15, wherein the configuration information includes in-progress moves**” as the exemplary migration plan of FIG. 2 starts by determining the terminal moves possible by comparing the initial configuration System 22 with the goal configuration system 26. It is possible for the store E with a capacity of 1 to be moved in terminal move 30 to device 1 since the store A with a capacity of 3 plus the store B with a capacity of 2 and the store E with a capacity of 1 will be equal to the device 1 capacity of 6 (**Borowsky** Col 6, Lines 28-46). The configuration include the information of the moves that are in progress since it knows when the moves in the plan were started and when the plan is finished.

Claim 17, 18, and 19 are essentially the same as claim 5 except they set forth the claimed invention as an apparatus and are rejected for the same reasons as applied hereinabove.

With respect to claim 20, **Borowsky** further teaches “**the apparatus of claim 15, wherein the adapter obtains a plan until no moves are pending**” as after a program has processed the possible moves, the then current configuration is compared with the goal configuration in the “goal configuration met?” decision block 172. If the goal configuration has not been met, the program proceeds back to the “select plan” block 152 and, if it has it, exits as the migration plan 120 (**Borowsky** Col 5, Lines 59-

64). The reference keeps on selecting a different plan until the configuration/(moves) have been met.

Claim 21 is essentially the same as claim 3 except it sets forth the claimed invention as an apparatus and is rejected for the same reasons as applied hereinabove.

Claim 22 is essentially the same as claim 4 except it sets forth the claimed invention as an apparatus and is rejected for the same reasons as applied hereinabove.

Claim 23 is essentially the same as claim 5 except it sets forth the claimed invention as an apparatus and is rejected for the same reasons as applied hereinabove.

Claim 24 is essentially the same as claim 6 except it sets forth the claimed invention as an apparatus and is rejected for the same reasons as applied hereinabove.

Claim 25 is essentially the same as claim 7 except it sets forth the claimed invention as an apparatus and is rejected for the same reasons as applied hereinabove.

Claim 26 is essentially the same as claim 8 except it sets forth the claimed invention as an apparatus and is rejected for the same reasons as applied hereinabove.

Claim 27 is essentially the same as claim 9 except it sets forth the claimed invention as an apparatus and is rejected for the same reasons as applied hereinabove.

With respect to claim 28, **Borowsky** further teaches **an apparatus for performing adaptive migration and execution, the apparatus comprising:**

**"means for obtaining a plan"** as the migration plan generator develops a plan that leads to the lowest contention for the system (**Borowsky** Col 2, Lines 35-36). The reference teaches that the plan is being developed for migration.

**"means for adapting the plan to satisfy migration constraints"** as the migration plan generator 100, the initial configuration data 110, the goal configuration data 112, and the set of constraints 114 are provided to a migration planner 116. The migration planner 116 either fails to develop a migration plan and exits to "fail" block 118 or produces a viable migration plan 120 (**Borowsky** Col 5, Lines 6-11). The plan being produced by the migration plan generator is only developed/adopted when the set of constraints provided to the planner are satisfied.

**"means for starting at least one move of a data chunk in the plan"** as the data stores are moved, or migrated, among the storage devices under the direction of a control 28 (**Borowsky** Col 4, Lines 49-51).

### ***Conclusion***

6. The prior art made of record and not replied upon is considered pertinent to applicant's disclosure is listed on 892 form.

***Contact Information***

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Usmaan Saeed whose telephone number is (571)272-4046. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hosain Alam can be reached on (571)272-3978. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Usmaan Saeed  
Patent Examiner  
Art Unit: 2166



Leslie Wong  
Primary Examiner

US  
December 21, 2005